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Land Management Programs for Agriculture in Southwest Georgia

Roger W. Hexem
W. Grant Reddig

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ABSTRACT

Land and water uses for a 32-county area in southwest Georgia in 1979 were identified and projected to 1990. An "ongoing" and an "accelerated" land treatment program to reduce erosion and curb sediment delivery from cropland were evaluated. With a moderate expansion in irrigation, net returns for six major crops plus small grains in 1990 were estimated at $240.7 and $257.9 million per year with the ongoing and accelerated programs, respectively, compared with the 1979 base year net return of $159.4 million.

Keywords: Southwest Georgia, soil erosion, land treatment programs, land treatment costs, supplemental irrigation, land use projections, linear programming, economic returns.

PREFACE

The State of Georgia requested a study of land and water use in a 32-county area of southwest Georgia. The study was conducted under the authority and provisions of Section 6 of the Watershed Protection and Flood Prevention Act, Public Law 566, by the Economic Research Service (ERS), the Forest Service (FS), and the Soil Conservation Service (SCS) within the U.S. Department of Agriculture. The State of Georgia was represented by the Soil and Water Conservation Committee and the Environmental Protection Division of the Department of Natural Resources.

Other Federal agencies supplying assistance and data were the U.S. Geological Survey, U.S. Army Corps of Engineers, Agricultural Stabilization and Conservation Service, U.S. Fish and Wildlife Service, and the National Weather Service. State departments or divisions contributing included the Office of the Governor, Office of Planning and Budget, Georgia Forestry Commission, Georgia Department of Agriculture, and the Georgia University System. The Commissioner's Office of the Georgia Department of Natural Resources coordinated inputs from the Park, Recreation and Historic Sites Division, Game and Fish Division, and Environmental Protection Division. Representatives from area planning and development commissions, soil and water conservation districts, and local governments actively participated in the study. Several were members of a steering committee advising study participants.

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SUMMARY

Trends toward more intensive farming, more cropland being irrigated, and increased municipal and industrial water use during the 1970's raise concerns about the quantity and quality of soil and water resources in southwest Georgia. These concerns were examined by a USDA study team, which developed resource management programs for a 32-county area for the 1979-90 period.

Two land treatment programs to control erosion and curb sediment delivery were evaluated. The ongoing program represents a continuation of present efforts while the accelerated program is designed to adequately treat all land with erosion and drainage problems. Several soils were identified as so erosive that conversion to permanent vegetation would be the only way to limit erosion to tolerable limits. About 150,000 acres of cropland were targeted for conversion to hay/pasture and another 92,500 acres to forest land with the accelerated program.

The accelerated program is more effective in reducing erosion and more costly, but also results in higher net returns to landowners and operators. If a moderate expansion in irrigation of 30,000 acres/year were to occur, sheet and rill erosion associated with the accelerated program is estimated to be 46 percent below the 1979 "base" level compared with only a 12-percent reduction with the ongoing program. Land treatment costs in terms of 1977-79 prices are estimated at $34 and $47.8 million/year for the ongoing and accelerated programs, respectively, compared to $19.1 million/year in 1979. In addition to these private costs to the landowner and/or operator, the public cost of Soil Conservation Service technical assistance is estimated at $1.2 and $1.9 million/year during 1979-90 for the ongoing and accelerated programs, respectively. Federal cost sharing for installing and maintaining practices was not included. This is an additional cost to the public but would reduce private costs to the farmer.

Estimated net returns with both ongoing and accelerated programs exceed land treatment costs and costs of SCS technical assistance. With a moderate expansion in irrigation, net returns for the major crops in 1990 were estimated at $240.7 and $257.9 million/year with the ongoing and accelerated programs, respectively, compared with $159.4 million in 1979. Costs of land treatments and land conversions have been deducted, public costs have not. On-site benefits are reflected in these net returns. Off-site benefits accruing to the public would include improved water quality as soil runoff from nonpoint sources is reduced, increased crop production

for domestic and export consumption, and stimulation of local and regional economies through expenditures for land treatment systems and higher net returns to landowners and operators. Values of off-site benefits were not estimated.

If projected yield increases resulting from improved technology and farm management were removed, net returns in 1990 would be reduced to $177.1 and $189.7 million/year, respectively, for the two programs. Narrower profit margins would reduce individual financial capabilities to install and maintain practices. Some practices would likely be abandoned or not replaced as the use-life of the practice ends. Consideration of the annualized costs of land treatment practices understates the burden of incurring initial costs of installing the practices. The annualized cost of no till may be only $3/acre; the cost of buying the no till planter will be several thousand dollars. Some operators could incur cash-flow problems.

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INTRODUCTION

The State of Georgia requested that the U.S. Department of Agriculture evaluate present and future land and water use in a 32-county area of southwest Georgia. This area was identified in the Georgia Water Quality Management Plan as having the highest potential for nonpoint source pollution from agriculture. Tremendous increases in the acres of cropland irrigated and substantial increases in municipal and industrial water use during the 1970's caused concern about the availability of water.

Programs for correcting erosion and drainage problems were developed and evaluated. "Base" conditions were simulated for 1979. Resource use and management were projected to 1990 for comparison with 1979 conditions.

Results of the study were summarized in a main report (4).1/ The economics of resource use and management in agriculture are examined in more detail here.

1/ Underscored numbers in parenthesis relate to sources listed in References.

STUDY AREA

The study area includes 32 of Georgia's 159 counties comprising about 7.7 million acres in southwest Georgia. About 47 percent of the area was in cropland and pasture in 1979. Another 47 percent was in forest land. The remaining 6 percent was in urban uses, water bodies, and miscellaneous uses.

About one-third of Georgia's $3 billion gross income from agriculture in 1979 was produced in southwest Georgia. Nearly 80 percent of the area's agricultural income was from crop production. Timber and wood products generated another $71.4 million of gross income. About $493 million originated from industrial and manufacturing operations.

Soils for nearly 3.4 million acres--44 percent of the land area--have been identified as "prime" for agricultural use. About half was in cropland in 1979. The rest was primarily in forest land and pasture.

Population in 1980 was 633,500, 14 percent higher than in 1970. While adding to the available work force and expanding the consumption sector, urban growth also results in conversions of land to nonagricultural uses and higher use levels of surface and ground water for municipal and industrial uses. Such conversions do not seem to be a significant areawide problem. Most occur in proximity to urban areas such as Albany, Americus, and Warner Robbins.

A plentiful supply of surface and ground water of good to excellent quality is available for a variety of uses. Even though rainfall averages 49 inches annually, cropland receiving supplemental irrigation increased from about 100,000 to 500,000 acres during 1970-79. Municipal and industrial use also increased.

RESOURCE MANAGEMENT PROBLEMS

Shifts to more intensive farming, including a substantial increase in cropland being irrigated, along with increases in municipal and industrial water use during the 1970's caused concerns among area residents about the quantity and quality of soil and water resources available for future use. The following major areas of concern were identified through public meetings held in each county: a decrease in net farm incomes, land use, water management and supply, and soil erosion. All concerns are interrelated. Levels of net farm incomes were not specifically addressed in the study; but, changes in incomes associated with alternative land treatment programs were estimated.

Land Use

Cropland acreage has been increasing since 1970. Nearly 250,000 acres of forest land were converted to cropland during 1971-79. Wetlands have been converted to other uses. Wetlands filter nutrients and sediment transported in soil runoff. Forest land and wetlands also provide wildlife habitat. These conversions often occur as field size is increased to accommodate center pivot irrigation systems. Levels of soil erosion and sediment delivery increase. Water quality can be degraded. Such land use conversions are expected to continue.

Conversions of agricultural land, particularly "prime" farmland, to nonagricultural uses raise concern about the availability of cropland for future use. Growth in population will require additional conversions to nonagricultural uses.

Soil Erosion

Most erosion occurs on cropland. Nearly 88 percent of the estimated 19.6 million tons of erosion in 1979 was on cropland (4). Such erosion averaged only 5.8 tons/acre/year which is close to the Soil Conservation Service (SCS) soil loss tolerance (T) of about 5 tons. The T value, also known as the level of permissible soil loss, represents the maximum rate of sheet and rill erosion that will still permit a high level of crop productivity to be economical for an indefinite period. Erosion in excess of T is expected to have a long-term adverse effect on productivity, especially where topsoil is relatively shallow. While most erosion is a process of displacement of soil particles in the direction of soil runoff with replacement from above, edge-of-the-field losses represent net displacements and, thus, soil depletion. Soil particles leaving the field are deposited in fence rows, roadbanks, and watercourses. Soil movements can also result in depositions within the field which, when large enough, can cause a swamping effect thereby reducing soil productivity.

About 1.1 million acres of cropland--one-third of all cropland--eroded in excess of T in 1979. Erosion averaged 11.6 tons/acre/year, more than twice the T value. Erosion on some fields was as high as 80 tons/acre/year. The net return foregone associated with continued erosion at rates exceeding T in 1979 was estimated at $2.65 per ton of soil erosion (4).

Erosion from cropland resulted in 1.7 million tons of sediment delivery in 1979. An estimated 1,570 acres of eroding roadbanks produced an additional 50,200 tons of sediment. Most of this sediment fills channels and wetland areas thereby increasing the possibility for flooding.

Water Management and Supply

The rapid expansion in irrigated acreage during 1970-79 and dry years in 1977, 1978, and 1980 resulted in substantial increases in withdrawal of surface and ground water. The availability of surface water is presently of lesser concern than that for ground water. If future withdrawals of ground water were at levels approaching the recharge rate, more surface water would be used for irrigation, and construction of additional treatment facilities for municipal use of surface waters would be likely. Both surface and ground water systems would need to be managed jointly for effective water management.

Degradation of water quality in southwest Georgia is usually associated with discharges of pollutants from urban and industrial sources. Few reports of pollution from nonpoint sources have been made (4). Maintenance of ground water quality requires good surface water quality in recharge areas and management of withdrawals from aquifer zones subject to contamination. Some aquifers have poor quality water zones that leak into good quality zones when withdrawals are excessive.

PRESENT AND PROJECTED CONDITIONS

"Base" conditions were developed for 1979 for comparsion with projections to 1990. SCS inventoried most of the acres of cropland, cropland use, and erosion on cropland in 1979. Acres in forest land, pasture, and urban land were estimated from interpretations of air photos. Water use for irrigation was estimated from acres irrigated and water requirements for supplemental irrigation of major crops. Municipal and industrial use was provided by the U.S. Geological Survey (USGS).

Projections of major land uses in 1990 were primarily based on recent trends. Acres of major crops within the cropland base were also projected.

Land

The number of farms and acres in farms declined during 1969-78 (table 1). Even with these declines, cropland acreage remained about the same. Conversions of cropland to nonagricultural uses were offset by conversions of forest land to crop production. Harvested cropland actually increased about 22 percent during this period. Average size of farm grew from 328 to 394 acres, a 20-percent increase. Average farm size in 1978 was 51 percent above the State average.

The 32-county share of Georgia's cropland increased to about 40 percent in 1978 (table 1). The percent of harvested cropland was slightly below 1969 and 1974 levels.

Table 1--Number of farms, land uses within farms, and average size of farm for southwest Georgia and respective percentages of Georgia

Item	Year		
	1969	1974	1978
		Number	
Number of farms	15,755	12,980	12,243
		1,000 acres	
Land in farms	5,166	4,891	4,820
Total cropland	2,659	2,534	2,724
Harvested cropland	1,761	1,930	2,140
Cropland for pasture	397	426	349
Other cropland[2/]	501	178	236
Woodland, including woodland pasture	1,928	1,667	1,581
Other land[3/]	579	690	515
		Acres	
Average size of farm	328	377	394
Share of State total:		Percent	
Number of farms	23.4	23.6	23.8
Land in farms	32.7	35.2	35.9
Total cropland	38.9	39.1	39.9
Harvested cropland	48.2	46.4	45.6
Cropland for pasture	21.6	23.3	23.6
Other cropland[2/]	37.2	36.6	35.8
Woodland, including woodland pasture	27.7	30.7	31.2
Other land[3/]	28.8	34.9	33.9
Average size of farm	140.2	149.0	151.0

1/ Because of changes in definitions and procedures, data are not strictly comparable among census years.
2/ Land in soil improvement crops, land on which all crops failed, and cropland idled.
3/ Pastureland and rangeland other than cropland and woodland pasture and land in farmsteads, ponds, roads, and wasteland.

Source: (5).

Nearly 50 percent of all farmers rented at least a portion of the cropland they harvested in 1978; 43 percent were similarly involved in 1974 (app. table 1). These farmers operated 75 percent of the harvested cropland in 1978 compared to 71 percent in 1974. Part owners and tenants with short-term leases and/or leases without provisions for landlord-tenant sharing of land treatment costs are expected to be less interested in erosion control on rented land than if they owned the land or had a long-term lease including landlord-tenant sharing of land treatment costs. The trend toward more part owners operating an increasing proportion of harvested cropland is expected to continue through 1990.

Close to 3 million acres or 39 percent of the 7.7 million acres in the study area were in cropland in 1979 (table 2). Another 8 percent was in pasture; 47 percent was in forest land. About 500,000 acres of the 3 million acres in cropland were irrigated in 1979. This represented 60 percent of the irrigated acreage in Georgia at that time.

About 3.4 million acres--44 percent of the land area--was classified as prime farmland. Fifty percent was used as cropland in 1979. The rest was primarily in forest land and pasture. SCS grouped soils into soil resource groups (SRG) according to suitability for crop production and land treatment needs.[2/] Nearly 90 percent of the cropland inventoried in 1979 was in SRG's suitable for cropland (app. table 2). About 79 percent of the pasture and forest land was also in SRG's suitable for crop production. Thus, about 3.3 million acres of pasture and forest land have the potential for conversion to cropland providing long-term economic returns.

Cropland acreage is projected to increase by 202,500 acres to 3.175 million acres in 1990 (table 2). Forest land is expected to be cleared for crop production. This conversion results in a loss of income to the forestry economy. Higher rates of soil erosion and sedimentation on the newly converted land will increase the need for land treatment systems.

Acres in urban and other uses are projected to increase by about 32,000 acres. This is primarily due to a projected increase in population of nearly 12 percent

2/ The soil resource groups are defined and described in (4).

Table 2--Major land uses in 1979 and projections to 1990

Land use	1979	1990
	1,000 acres	
Cropland	2,972.5	3,175.0
Pasture	573.1	573.0
Forest land	3,636.4	3,401.7
Water	76.9	76.9
Urban and other	402.1	434.4
Total	7,661.0	7,661.0

during 1980-90 (3). An average 0.6 acre/person was assumed necessary to support the growth in population.3/

Cropland

Corn, soybeans, cotton, peanuts, and tobacco are the major crops grown in southwest Georgia (table 3). On a per acre basis, tobacco and peanuts are the high-value crops. Sizable increases in soybean, cotton, and sorghum acreages are projected for the 1979-90 period. Acres in peanuts and tobacco are expected to remain at about the allotted acreage levels in 1979. Because of expansions in acres under irrigation and rapid growth in acres double cropped, a substantial increase in acres planted to small grains is projected. Small grains are usually double cropped with soybeans and sorghum. Acres in hay and cropland pasture were based on projections of livestock numbers and per unit requirements for forage consumption.

Irrigated acreage in Georgia increased from 145,000 acres in 1970 to about 840,000 acres in 1979. Nearly 510,000 acres--60 percent of the State total--were irrigated in the 32-county area in 1979. An additional 330,000 acres of cropland are projected to be under irrigation in this area by 1990. With installation of center pivot irrigation systems, some marginal cropland including small

3/ An average of 0.25 acre/person was assumed for Dougherty and Houston counties, the most urbanized counties in the study area.

Table 3--Cropland use in 1979 and projections to 1990

Cropland use	1979	1990
	1,000 acres	
Corn	855.5	848.2
Soybeans	758.4	866.0
Peanuts	423.3	425.0
Cotton	94.6	135.4
Tobacco	23.4	24.0
Sorghum	40.0	85.4
Small grains[1/]	142.0	800.0
Vegetables	27.1	35.0
Orchards	126.1	140.0
Hay	75.0	80.0
Cropland pasture	330.0	340.0
Other cropland[2/]	219.1	196.0
Total	2,972.5	3,175.0

1/ Small grains double cropped with soybeans or sorghum.

2/ Minor crops, idle cropland, and cropland in conservation crops.

wetland areas, steeply sloping land, and land with erosive soils is being brought into production. Wooded areas are also being cleared to increase the coverage of the pivot system. These land conversions and more intensive use of open land result in higher levels of soil erosion and sedimentation.

Soil erosion

Erosion on the 7.6 million acres of land was about 19.7 million tons/year in 1979. Around 11 percent or 2.1 million tons was estimated to move from source areas as sediment delivered to waterways, reserviors, and wetlands. Most erosion occurs on cropland.

Erosion on 2.97 million acres of cropland averaged only 5.8 tons/acre/year in 1979 (table 4). However, 1.1 million acres eroded at a rate in excess of T. Erosion on these acres averaged 11.6 tons/acre/year, about twice the T value (4). About 10 percent of the erosion on cropland is estimated to result in sediment delivery. With an increase in cropland by 1990 and with maintenance of land treatment practices in place in 1979, annual soil erosion on cropland is estimated to increase to 19,042,000 tons or to 6 tons/acre/ year. Yet, about 1.2 million acres would be eroding at a rate greater than T.

Land Treatment

Land treatment systems and acres treated in the "base" conditions were identified by SCS. Terracing and contouring were the principal practices in place. Acres eroding in excess of T were focal points for devising land treatment systems to reduce or control soil erosion by 1990. Other acres were identified as needing improved drainage. Land treatment systems were devised for individual SRG's. Two land treatment programs were developed for potential implementation during the 1979-90 planning period.

Water

Availability of water is generally very good. Large streams and rivers have dependable flows. The availability of surface water is presently of lesser concern than that for ground water. Levels of some aquifers tend to fluctuate during heavy withdrawals in the summer, but rainfall during other seasons normally recharges the aquifers. Water shortages occur in particular areas in dry years. The estimated pump capacity for the area's 2,400 irrigation wells in 1980 was 3.3 billion gallons per day, BGD (4). This represents two-thirds of the average daily ground water supply available in the 32-county area. When large numbers of the irrigation wells

Table 4--Erosion on and sediment delivered from cropland in 1979 and projections to 1990

Item	1979	1990 1/
	Acres	
Cropland	2,972,500	3,175,000
	Tons per year	
Soil erosion	17,261,000	19,042,000
Sediment delivery	1,726,000	1,904,000

1/ Land treatments in place in 1979 are maintained. No additional treatments are installed during 1979-90.

are operating at or near pump capacity at the same time, some temporary lessening of water available from shallower wells and reductions of flow in surface streams result.

Water use in 1979 was estimated at 683 million gallons per day (MGD): 411 MGD for agricultural use and 272 MGD for all other uses. About 64 percent, 436 MGD, was withdrawn from ground water systems. Only the Clayton Aquifer system which has a very limited recharge area shows evidence of aquifer mining. Average daily withdrawals of ground water in 1979 were only 9 percent of the 4.8 BGD estimated to be the average supply available for use. No areawide problems currently exist or are expected over the next decade.

Municipal and industrial use is projected to increase from an average 272 MGD in 1979 to 307 MGD in 1990. An additional 330,000 acres are projected to be irrigated by 1990. This would add another 1,150 wells to the 2,400 in place in 1980. Agricultural uses are projected to increase from an average 411 MGD in 1979 to 570 MGD in 1990.

Value of Production

Gross income from agricultural production totaled about $1 billion in 1979. An additional $71.4 million was generated from sales of timber and wood products. About 17 percent of the farms had agricultural sales of $100,000 or more in 1978 (app. table 3). Nearly 13 percent had sales at that level in 1974. A large number of small-scale farms are being operated. Thirty-eight percent of the farms had sales of less than $10,000 in 1978, 42 percent in 1974. Small-scale operators are expected to have a relatively low financial capability for installing and maintaining land treatment systems. However, some likely supplement their farm income with off-farm work. Nearly one-third of the

farmers reported working off the farm for 150 days or more in 1978 compared to about one-fourth in 1974 (5).

No projections were made. Value of production and net returns for the major crops are estimated when alternative land treatment programs for 1990 are evaluated.

ANALYSES OF RESOURCE MANAGEMENT PROGRAMS

Resource management programs have differing effects on land and water use, costs of installing and maintaining land treatments, and economic returns to the landowner or operator. The types and magnitudes of these effects are particularly important when installation and maintenance of recommended land treatments are done voluntarily.

Water use relative to availability in 1979 and 1990 is not an areawide problem and, consequently, was not directly considered in the programs evaluated in this study. The ongoing shift from nonirrigated to irrigated production does, however, affect economic returns and land treatment needs, particularly the need for improved drainage. Two levels of expansion in irrigated acres were considered: 30,000 and 60,000 acres per year during 1979-90.

Land use decisions are usually made individually by landowners and independently of public concerns for land use. Public preferences can be reflected in local ordinances and zoning regulations which restrict land use options, soil and water conservation programs, provisions in tax codes, and so on.

The principal focus in the resource management programs developed here was on reducing or controlling soil erosion on cropland by 1990. Six major crops plus small grains were considered. These crops represent nearly all the cropland on which soil erosion is a problem.

Cropland use, land treatments, levels of erosion, and cost and return budgets were used to develop linear programming models for simulating "base" conditions in 1979 and estimating conditions in 1990. Following discussions of components of the models, results are described and evaluated.

Normalized Prices

Costs of production inputs and prices received by farmers were based on normalized prices for the 1975-79 period. These prices are weighted averages of prices during this period to adjust for short-term price fluctuations. Prices for recent years are weighted most heavily in deriving the weighted average (2). The normalized prices and price relationships were also used to analyze conditions in 1990.

Prices for the six major crops and for small grains were the following: corn ($2.48/bu), soybeans ($6.32/bu), peanuts ($0.206/lb), cotton ($0.599/lb), tobacco ($1.362/lb), sorghum ($2.21/bu), wheat ($3.09/bu), rye ($1.98/bu), and oats ($1.36/bu).

Crop Yields

Crop yields for each SRG with treated (erosion $\leq$ 5 tons/acre/year) and untreated (erosion $\geq$ 16 tons/acre/year) conditions for irrigated and nonirrigated production were developed by SCS. Yields for the 6-10 and 11-15 tons/acre/year erosion groups were estimated through linear interpolations. Yields were developed to represent average management and weather. The four erosion phases were not applicable to all SRG's. SRG's containing, for example, IIw and IIIw soils do not erode at 11-15 or 16+ tons/acre/year.

Crop yields were multiplied by acres inventoried for each erosion phase within each SRG to derive levels of production for major crops for comparison with production in the 32-county area in 1979 as reported by the Georgia Crop Reporting Service. Yields for a few crops were adjusted in order to simulate "base" conditions.

Because of lack of data on relationships between erosion and yields, two assumptions concerning yields affect evaluation of land treatment systems. First, if an acre was eroding at a specified rate in 1979 and no land treatment was installed during 1979-90, the 1979 yield for that erosion phase was assumed unchanged for 1990. That is, the ongoing erosion was assumed to have no effect on yields. Second, if an acre was eroding at, for example, 13 tons/acre/year and with treatment some time during 1979-90 erosion was reduced to $\leq$ 5 tons/acre/year, the higher yield for the lower erosion rate was assumed to be realized by 1990. These assumptions were used independently of the (1) increased yields due to improvements in technology or management, and (2) no change in yields from 1979-90 when yield changes due to improvements in technology and management were removed.

SCS projected crop yields to 1990. The annual percentage increases reflect expected improvements in technology and farm management (table 5). The allotment programs for tobacco and peanuts were assumed to be unchanged. Since these programs include marketing quotas, yields were assumed to be at 1979 levels.

Land Treatment Programs

SCS did not identify land treatments in place in its inventory of cropland use in 1979. The distribution of

Table 5--Annual percentage increases in yields due to improved technology and management, 1979-90

Crop	Annual increase	
	Nonirrigated	Irrigated
	Percent	
Corn	1.1	1.5
Soybeans	1.0	1.5
Peanuts	0	0
Cotton	1.6	1.6
Tobacco	0	0
Sorghum	3.0	3.0
Small grains	1.0	1/

1/ Assume nonirrigated production only.

crop acreages among erosion groups--0-5, 6-10, 11-15, 16+ tons/acre/year--within each SRG was examined. Based on SCS records and Universal Soil Loss Equation (USLE) calculations, SCS estimated treatments that were in place in 1979 in order to reduce erosion to the inventoried levels.

Some acres were fully treated; no erosion or drainage problems were evident. Other acres were partially treated or were entirely untreated. These latter acres were identified for treatment needs in the land treatment programs for 1979-90. All practices in place in 1979 were assumed to be maintained into 1990. The annualized costs of installation and maintenance were included in the cost and return budgets.

No allowance for cost sharing of installation costs was included in the 1979 or 1990 evaluations. Costs of technical assistance provided by SCS were also excluded.

Two land treatment programs were developed for analysis. The "ongoing" program represents an extension of recent trends in types of treatment installed and acres treated.

No change in emphasis of technical assistance or new or accelerated programs are assumed to occur by 1990. The "accelerated" program has about the same mix of practices as the ongoing program, but technical assistance is increased to permit adequate treatment of all identified erosion and drainage problems.

Several SRG's were identified as having soil characteristics such that erosion could be reduced to T or less only by conversion to permanent vegetation. About 150,000 acres of cropland were targeted for conversion to hay/pasture. Another 92,500 acres of cropland would be converted to forest land.

Irrigated Cropland

Levels of water use for supplemental irrigation were obtained from the Coastal Plains Experiment Station in southwest Georgia. Data were not available to vary water use or needs among individual SRG's. Consequently, 13 acre inches of water were used to irrigate corn on slightly or moderately erosive soils as well as on sandy soils. Seven acre inches were used for soybeans and so on. The annualized costs of installing and operating irrigation systems were included in the crop budgets.

Moderate and high expansions of 30,000 and 60,000 acres per year, respectively, were included in the analyses of conditions in 1990. Projections of the maximum percent of acres irrigated for individual crops were developed. For example, a maximum of 30 percent of the corn acreage was projected for the moderate expansion, 45 percent for the high expansion. Without these maxima, all cropland in high-value crops such as tobacco and peanuts would be irrigated. This was not the situation in 1979. It is not expected to occur in 1990. Water use for individual crops in 1990 was unchanged from the 1979 levels.

Government Programs

Programs in operation during 1979 were assumed to be in effect in 1990. For example, allotted acres of tobacco and peanuts in 1979 were also used in developing 1990 conditions. Levels of exports reflected in 1979 "normalized" prices are also assumed to occur in 1990. No new public programs of cropland expansion or retirement were considered.

Models

"Base" level and projected land use, cost and return budgets, land treatment systems, and irrigated acreage were incorporated into linear programming models. The models were formulated to maximize net economic returns

to land, management, and risk within the context of cropland availability, cropping patterns, irrigation systems, and land treatment systems in 1979 and projected levels in 1990. The models were static.

Only cropland in the six major crops plus small grains was included in the models. Hay, pasture, and silage requirements were derived from projections of numbers of cattle and calves. Land and cropland to meet these requirements were, in effect, set aside and not included. Acres in vegetables and orchards were also projected and set aside. Acres for these uses of land in 1990 not included in the models were distributed among SRG's in a pattern similar to those inventoried for the 1979 "base" conditions.

Projected acres for the major crops were distributed among SRG's in a pattern reflecting "base" conditions. Otherwise, those rotations including the most profitable crops such as tobacco and peanuts would all be produced on Class I land in SRG 1. For similar reasons, bounds had to be placed on crop acreages within each SRG for both irrigated and nonirrigated production. Again, without these bounds, all cropland would be used in the most profitable rotation. Such results across SRG's could not be consistent with projected acres of individual crops. Also, land use patterns in the 1979 inventory were such that most crops were grown on all SRG's. The bounds ensured that such a diversified cropping pattern also occurred in 1990. Finally, several crops are required to be grown in rotations to avoid or minimize disease and nematode problems.

Net returns were adjusted for crop failure and for land conversion costs. No estimates of net returns for minor crops or for the value of forage in livestock production were made.

The derived value of production for those crops included in the model to simulate "base" conditions was 94 percent of the comparable value reported by the Georgia Crop Reporting Service.

RESULTS OF ANALYSES

Since neither present nor projected water use was determined to be an areawide problem, the focus of the analyses was on reducing or controlling soil erosion and the associated impacts on land use, net returns, and land treatment costs. The ongoing and accelerated land treatment programs described earlier were evaluated. Evaluations of 1990 conditions are compared to 1979

"base" conditions. Evaluations were confined to land use and crop production for the six major crops plus small grains.

Land Treatment Programs

Acres in various land treatments for the "base" and 1990 conditions are summarized in table 6. Contouring and terracing were the principal land treatments in place in 1979. Relatively few acres were in no till cultivation. Some practices are installed in combination with others. The annualized cost of installing and maintaining these practices was about $19.1 million/year in 1977-79 prices.

Both the ongoing and accelerated land treatment programs include substantial increases in acres with contouring and no till by 1990. These are relatively low-cost practices compared to structural measures such as terraces, diversions, and improved drainage. Annual costs of installing and maintaining land treatment systems with a moderate expansion in irrigation by 1990 are estimated to increase by 33 and 53 percent over the 1979 "base" level for the ongoing and accelerated programs, respectively. The additional costs of SCS technical assistance are estimated at $12.8 and $20.4 million in 1979 dollars over 1979-90 for the respective programs to treat land, including cropland in major and minor crops, gulleys, and road-banks.

Recall that the cropland base was projected to increase by 202,500 acres during 1979-90 through conversion of forest land to cropland. An additional 32,000 acres of forest land converted to cropland are necessary to offset the projected conversions of cropland to urban and other uses to support projected increases in population. The annualized cost of these conversions is estimated at about $8.5 million/year for land clearing and preparation. Since erosion on some severely eroding cropland can be reduced to T or less only by conversion to permanent vegetation, about 150,000 acres were targeted for conversion to hay/pasture with the accelerated program. Another 92,500 acres would be converted to forest land. Land use conversions are projected to occur on erosive soils such as those in Classes IVe-VIIe and IIIs-VIIs. These conversions along with 234,500 acres of forest land converted to cropland are estimated to have an annual cost of about $18.4 million. No conversions of cropland to permanent vegetation are included in the ongoing program.

Table 6--Land treatments with ongoing and accelerated programs with moderate and high expansions in acres irrigated compared to "base" conditions [1/]

Land treatment	1979 "base"	1990 moderate irrigation expansion[2/]		1990 high irrigation expansion[3/]	
		Ongoing land treatment[4/]	Accelerated land treatment[5/]	Ongoing land treatment[4/]	Accelerated land treatment[5/]
			Acres		
Contouring	187,800	466,200	535,300	467,700	535,300
Terracing	399,000	496,100	541,200	497,000	541,200
No till	27,600	117,000	184,200	116,800	184,200
Diversions	19,600	17,600	15,900	17,600	17,100
Surface drainage	141,600	147,400	178,100	134,900	154,300
Subsurface drainage	41,800	70,800	104,600	102,400	129,200
Cropland conversions[6/]	0	0	262,400	0	262,400
			Dollars		
Land treatment costs[7/8/]	19,140,000	25,517,000	29,344,000	27,367,000	30,609,000
Land conversion costs[9/]	0	8,488,000	18,432,000	8,488,000	18,432,000

1/ Treatments to alleviate sheet and rill erosion and drainage problems on cropland in major crops: corn, soybeans, peanuts, tobacco, cotton, grain sorghum, and small grains.
2/ 30,000 acres/year within the 32-county area during 1979-90.
3/ 60,000 acres/year within the 32-county area during 1979-90.
4/ Projection of current trend in acres being treated.
5/ All cropland is adequately treated to reduce erosion to 5 tons/acre/year or less and to eliminate drainage problems.
6/ Conversions of cropland to hay, pasture, and forest land.
7/ Cost sharing is not included.
8/ In addition to these annualized costs based on 8-percent interest, SCS estimates of annual cost of SCS technical assistance are $1.2 million and $1.9 million in 1979 dollars for the ongoing and accelerated programs, respectively. to treat cropland in major and minor crops, gulleys, and roadbanks.
9/ Annualized costs in 1977-79 prices of conversions of forest land to cropland and of cropland to pasture or forest land.

A high expansion in irrigation--60,000 acres/year--would require improved drainage on more acres than if the moderate expansion occurred. Also, with a high expansion, relatively more subsurface drainage is required than with a moderate expansion. Annualized land treatment costs would increase by about $1.8 and $1.3 million over respective treatment costs for the two programs with a moderate expansion in irrigation.

Sheet and rill erosion on 2.1 million acres in the six major crops in 1979 was estimated to be about 13 million tons/year (table 7). The relatively low average of 6.2 tons/acre/year can be misleading. About 41 percent of this cropland was eroding in excess of T or 5 tons/acre/year. Sheet and rill erosion on this cropland averaged 9.9 tons/acre/year. If all cropland were fully treated to reduce erosion to 0-5 tons/acre/year with an average of 3 tons, about half--6.3 of the 13 million tons/year--would be ongoing erosion that is not depleting soil productivity and, therefore, not considered to be a resource management problem unless sediment delivery was a problem.

Following implementation of the ongoing program during 1979-90, erosion would be reduced by only about 12 percent to around 11.5 million tons/year (table 7). An increase of 202,500 acres in the cropland base resulted in more acres being subjected to erosion. With this program, 21 percent of land in major crops would still be eroding at a rate greater than 5 tons/acre/year. Annualized land treatment costs are estimated to increase to $25.5 million/year for the moderate expansion in irrigation, about one-third higher than the 1979 "base" level (table 6).

With the accelerated program to adequately treat all land with erosion and water management problems, erosion is reduced to an average 3 tons/acre/year or about 7 million tons/year. This represents a 46-percent reduction from the 1979 level. Annualized land treatment costs and costs of converting cropland to permanent vegetation with a moderate expansion in irrigation are estimated at $39.3 million/year, an average of $21.6/year for each acre treated. As noted earlier, some acres are treated with more than one practice. While annual erosion has nearly been cut in half, the annualized cost of land treatment systems more than doubled from 1979 to 1990.

Table 7—1990 conditions with moderate and high expansion in acres irrigated and with ongoing and accelerated programs compared to "base" conditions

Item	1979 "base"	1990 moderate irrigation expansion[1]		1990 high irrigation expansion[2]	
		Ongoing land treatment[3]	Accelerated land treatment[4]	Ongoing land treatment[3]	Accelerated land treatment[4]
			Acres		
All Cropland: [5]					
0-5 t/ac/yr	1,236,800	1,836,800	2,338,000	1,836,200	2,338,900
6-10 t/ac/yr	682,000	349,800	0	349,500	0
11-15 t/ac/yr	100,000	84,800	0	86,100	0
16+ t/ac/yr	74,100	53,000	0	53,000	0
Irrigated cropland: [5]					
0-5 t/ac/yr	263,300	572,300	665,800	810,300	952,200
6-10 t/ac/yr	180,400	113,500	0	148,300	0
11-15 t/ac/yr	12,300	24,000	0	34,000	0
16+ t/ac/yr	11,500	12,900	0	18,200	0
			Dollars		
Net returns [6]	159,430,000	240,697,000	257,892,000	259,123,000	277,141,000
			Acre inches		
Irrigation water used	4,432,300	6,396,700	5,843,900	9,024,900	8,528,800
			Tons per year		
Soil erosion [7]	13,033,700	11,490,800	7,023,900	11,460,300	7,025,400
			Acres		
Acres treated	817,400	1,315,100	[8] 1,559,300	1,336,400	[8] 1,561,400

1/ 30,000 acres/year within the 32-county area during 1979-90.
2/ 60,000 acres/year within the 32-county area during 1979-90.
3/ Projection of current trend in acres being treated.
4/ All cropland is adequately treated to reduce erosion to 5 tons/acre/year or less and to eliminate drainage problems.
5/ Major crops only: corn, soybeans, peanuts, tobacco, cotton, and grain sorghum. All small grains are double cropped with soybeans or grain sorghum.
6/ Annual returns to land, management, and risk in terms of 1975-79 normalized prices. Land treatment costs, land conversion costs, and adjustments for crop failure are included.
7/ Annual sheet and rill erosion.
8/ Excludes 262,400 acres of cropland converted to hayland, pasture, and forest land.

Results associated with the high expansion in acreage irrigated are not discussed here. Interpretations are similar to those made for the moderate expansion.

Irrigation Water Use

About 1 in 5 acres in major crops in 1979 was also irrigated (table 7). Use for supplemental irrigation averaged 9.5 acre inches/acre. Peanuts and tobacco had the highest percentage of acres irrigated. These are also high-value, cash crops.

With a moderate expansion in irrigated acreage of 30,000 acres/year during 1979-90, about one-third of the cropland in the major crops would be irrigated if the ongoing program were implemented. Water use is estimated to increase to to 6.4 million acre inches per year, 44 percent above the 1979 use level. Acres irrigated and water use are somewhat lower with the accelerated program. This results from a reduction in the acres of the major crops being irrigated on severely eroding land in 1979 being converted to hay with implementation of the accelerated program. Hay is not included in the major crops.

With a high expansion in acres irrigated--60,000 acres/year--about 43 percent of cropland in major crops is irrigated in conjunction with the ongoing program. Water use at about 9 million acre inches per year is slightly more than double the water use in 1979.

Net Returns

Net returns to land, management, and risk in 1979 were estimated at $159.4 million (table 7). These returns are net of the annualized land treatment costs totaling $19.1 million. No allowance for Federal cost sharing in the installation of land treatment systems through the Agriculture Conservation Program (ACP) or other programs has been included.

Several factors affect net returns during 1979-90. Consequently, there are difficulties in attributing overall effects to specific sources including, for example, land treatment programs. Acreage of the six major crops is projected to increase by about 232,000 acres. This additional cropland is expected to be developed through clearing trees on relatively good soils. The projected increases in acres irrigated represent sizable shifts from nonirrigated to irrigated production. Most of this increase is in the production of the six major crops. Irrigation also permits relatively more intense cropping including multiple cropping. Installation of land treatment systems recommended by SCS not only increases production costs but also crop yields over time and, in turn, total returns. Also, marginal cropland converted to

permanent vegetation with the accelerated program is expected to be offset by conversions of woods to cropland on relatively more productive soils. Finally, yield increases due to improved technology and management were projected by SCS for all major crops except peanuts and tobacco.

Net returns in 1979 and 1990 are in terms of 1975-79 normalized prices for prices paid and received. Since 1990 dollars have a real value identical to 1979 dollars, comparisons between 1979 and 1990 levels can be made without discounting the 1990 returns.

With a moderate expansion in acres irrigated, annual net returns associated with the ongoing and accelerated land treatment programs are estimated to be about $240.7 million and $257.9 million, respectively, in 1990. These levels are about 51 and 62 percent above 1979 "base" returns. Net returns are even higher with a high expansion in acres irrigated. Even though the accelerated program has higher land treatment and land conversion costs relative to the ongoing program, net returns are also higher. Most of the marginal cropland in the "base" situation that would be converted to forest land or pasture with an accelerated program had negative net returns. Through land use conversions, the negative returns for the major crops are foregone, and these acres previously in cropland would be offset by conversions of forest land to cropland on less erosive and generally more productive soils.

The effects of yield increases associated with improved technology and management were removed in order to examine the effects of land treatment programs on net returns more closely (table 8). Other effects due to an increase in the cropland base and more intensive cropping continue. Since the moderate expansion in irrigation was considered most likely to occur, the high expansion scenario was not considered in this evaluation. Net returns are considerably lower when projected yield increases are removed. Annual returns with the ongoing program and a moderate expansion in irrigation are estimated at $177.1 million in 1990. Returns at this level are 11 percent above those for 1979 but 26 percent below comparable returns when the yield increases are included. Returns with the accelerated program are 19 percent above the 1979 level but 26 percent below those including yield increases. These comparisons provide emphasis to the importance of specifying assumptions concerning yield increases due to technological improvements and to erosion control when evaluating resource management programs.

Table 8--1990 conditions with moderate expansion in acres irrigated, without technological improvements, and with ongoing and accelerated programs compared to "base" conditions

Item	1979 "base"	1990 moderate irrigation expansion 1/	
		Ongoing land treatment	Accelerated land treatment
		Acres	
All cropland: 2/			
0-5 t/ac/yr	1,236,800	1,835,300	2,336,200
6-10 t/ac/yr	682,000	348,500	0
11-15 t/ac/yr	100,000	84,700	0
16+ t/ac/yr	74,100	53,000	0
Irrigated cropland: 2/			
0-5 t/ac/yr	263,300	568,700	662,800
6-10 t/ac/yr	180,400	100,400	0
11-15 t/ac/yr	12,300	22,800	0
16+ t/ac/yr	11,500	11,500	0
		Dollars	
Net returns 3/	159,430,000	177,145,000	189,735,000
		Acre inches	
Irrigation water used	4,432,300	6,310,300	5,808,100
		Tons per year	
Soil erosion 4/	13,033,700	10,610,100	7,010,400
		Acres	
Acres treated	817,400	1,315,100	5/ 1,559,300

1/ 30,000 acres/year within the 32-county area during 1979-90.
2/ Major crops only: corn, soybeans, peanuts, tobacco, cotton, and sorghum. All small grains are double cropped with soybeans or grain sorghum.
3/ Annual returns to land, management, and risk in terms of 1975-79 normalized prices. Land treatment costs and costs of land conversions associated with accelerated land treatment programs are included. Adjustments for crop failure are included.
4/ Annual sheet and rill erosion.
5/ Excludes 262,400 acres of cropland converted to hayland, pasture, and forest land.

LIMITATIONS

Landowners and(or) operators have differing attitudes toward and financial capabilities for voluntary installation and maintenance of land treatment practices recommended by SCS. Landownership and length of planning horizon are expected to be especially important when land use conversions are recommended in land treatment programs. Analyses in this study abstract from such factors which are important in decisionmaking processes.

The analyses completed here provide an overview of the problems, costs, and anticipated outcomes. The distributions of costs and benefits to individual landowners over time are not known. Consequently, individual and collective effects of landowners' responses to future conditions including implementation of land treatment programs can only be estimated. Farm-by-farm analyses--the specifics within the overview--can, however, be conducted through economic analyses of farm conservation plans developed jointly by the SCS district conservationist and the landowner or operator.

Several factors including an increase in the cropland base, shifts from nonirrigated to irrigated production, increases in yields, and installation of land treatment programs interacted to affect evaluations for 1990. The interaction results in difficulties in segregating individual effects such as the relative impacts of installing the two land treatment programs.

Normalized prices and price relationships used in 1979 were also used in 1990. Production increases in southwest Georgia are assumed to have no effect on prices received and paid. Similarly, any production adjustments outside the study area are assumed to have no impact on resource use and management within southwest Georgia.

The impacts of changes in levels of soil erosion on crop yields are unclear. Yields were estimated by SCS for fully treated and untreated conditions--5 and 20 tons/acre/year, respectively--with interpolations for intermediate erosion groups. Whenever an acre of cropland was shifted from one erosion group to another following installation of a land treatment practice, the higher yield associated with the lower erosion level was assumed to hold regardless of the timing of installing the practice. If, for example, terracing reduced erosion on Class IIIe land from 23 tons/acre/year to less than 5, corn yields were adjusted from 45 to 49 bushels/acre regardless of whether the terraces were installed in 1980 or 1989. The Erosion-Productivity Impact Calculator (EPIC) work currently underway within USDA will

help people to better understand these relationships between the timing and levels of changes in yields associated with changes in levels of erosion.

Agricultural production in southwest Georgia is highly intensive. Generalizations of study results to other portions of Georgia and the Southeast should be made with caution.

CONCLUSIONS

Neither present nor projected water use was determined to be an areawide problem. Soil erosion and sediment delivery associated with erosion will be ongoing problems. Most originate on cropland.

Land use conversions are occurring. Growth in population will require additional conversions of agricultural land, including "prime" farmland, to nonagricultural uses. However, only about 32,000 acres of cropland and pasture are projected to be converted during 1979-90. Most conversions will occur near urban centers. Southwest Georgia has a reservoir of potential cropland. About 3.4 million of the 7.6 million acres of land are classified as "prime" for farmland. Much is currently in forest land. These lands are also usually prime for forestry and nonagricultural uses. Future use will generally depend on the relative profitability among competing uses.

Erosion can be reduced and(or) controlled but not without costs to the landowner and the public. The time stream of costs and returns is especially important to the landowner. Analyses developed here are based on annualized costs and returns. Prices received and paid are in terms of 1975-79 and 1977-79 normalized prices, respectively. Annualized costs of SCS technical assistance are based on 1979 dollars.

Two land treatment programs were evaluated but not in isolation of other influences. These included an increase in the cropland base, conversions of marginal cropland to permanent vegetation offset by conversions of relatively productive forest land to cropland, shifts from nonirrigated to irrigated production, and more intensive use of cropland during 1979-90. The accelerated program is more effective in reducing erosion and more costly, but also results in higher net returns to landowners and operators than does the ongoing program. Estimated net returns with both programs exceed land treatment costs and costs of SCS technical assistance.

If a moderate expansion in irrigation of 30,000 acres/year were to occur, sheet and rill erosion associated with the accelerated program is estimated to be 46 percent below the 1979 "base" level compared with only a 12-percent reduction with the ongoing program. Land treatment costs are estimated at $34 and $47.8 million/year for the ongoing and accelerated programs, respectively, compared to $19.1 million/year in 1979. In addition to these private costs to the landowner and/or operator, the public cost of SCS technical assistance is estimated at $1.2 and $1.9 million/year for the ongoing and accelerated programs, respectively. Federal cost sharing for installing and maintaining practices was not included. This is an additional cost to the public but would reduce private costs to the landowner-operator.

Benefits will also accrue to the public. Reductions in soil erosion and runoff will help maintain soil productivity over time. In addition to this on-site benefit reflected in annual net returns, off-site benefits should include improved water quality associated with less soil runoff from nonpoint sources, increases in crop production for domestic and export consumption, and spread effects stimulating local and regional economies through expenditures for installing and maintaining land treatment systems and through higher net returns to landowners and operators. Values of off-site benefits were not estimated. With a moderate expansion in irrigation, net returns for the major crops associated with the ongoing and accelerated programs in 1990 were estimated at $240.7 and $257.9 million/year, respectively, compared with $159.4 million in 1979. Private costs of land treatments and land conversions have been deducted from net returns. Costs of SCS technical assistance have not been subtracted. Most of the marginal cropland in the "base" situation that would be converted to forest land or pasture with an accelerated program had negative net returns. Through land use conversions, the negative returns are foregone, and these acres previously in cropland would be offset by conversions of forest land to cropland on less erosive and more productive soils. If projected yield increases resulting from improved technology and farm management were removed, net returns in 1990 would be reduced to $177.1 and $189.7 million/year, respectively, for the two programs. Narrower profit margins would reduce individual financial capabilities to install and maintain practices. Some practices would likely be abandoned or not replaced as the use-life of the practice ends. Consideration of the annualized costs of land treatment practices understates the burden of

incurring initial costs of installing the practices. Cash-flow problems could result for some farmers. The annualized cost of no till may be only $3/acre; the cost of buying the no till planter will be several thousand dollars.

An increasing percentage of cropland is being operated by part-owners. Short-term leases and leases that do have provisions for landlord/tenant sharing of land treatment costs are not conducive to installation and maintenance of land treatment systems.

Participation in soil conservation programs has been voluntary. Increased public expenditures to raise participation will need to be evaluated in the context of competing uses for public monies and pressures to limit overall increases in public spending.

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Appendix Table 1--Percentage distribution of number of farms and acres of harvested cropland by tenure, southwest Georgia

Tenure	Number of farms		Harvested cropland	
	1974	1978	1974	1978
	Percent			
Full owners	57.1	50.4	29.0	24.6
Part owners	30.3	35.8	59.0	63.7
Tenants	12.6	13.8	12.0	11.7
Total	100.0	100.0	100.0	100.0

Source: (1).

Appendix Table 2--Percentage distribution of major land uses among soil resource groups, 1979 1/

Soil resource group	Land capability class	Cropland 2/	Pastureland	Forestland	Other 3/
		Percent			
1	I	17.1	9.3	5.8	7.8
2	IIe	36.6	22.7	14.4	16.7
3	IIe	6.5	6.4	3.4	4.1
4	IIIe	3.0	4.0	2.9	2.4
5	IIIe, IVe	3.1	5.4	3.5	2.9
6	IIs	11.0	10.6	8.3	7.7
7	IIIs, IVs	1.2	2.0	1.9	2.1
8	IVe, VIe	.7	2.4	2.0	1.5
9	IIw, IIIw	6.9	9.3	9.7	7.6
10	IVw-VIIw	7.9	14.8	32.0	20.2
11	IIIs-VIIs	3.4	5.9	5.9	4.1
12	IVs-VIIs	.4	1.2	1.8	1.2
13	IIIe-VIe	1.0	2.7	2.3	1.3
14	IVe-VIIe	.5	1.8	3.6	2.1
15	IIIw, IVw	.2	.4	.6	.5
16	IIw, Vw	.2	.4	.3	.5
17	4/	.3	.7	1.6	17.3
Total		100.0	100.0	100.0	100.0

1/ Soil resource groups are defined in (4).
2/ Includes cropland pasture and hay.
3/ Urban and other uses.
4/ IIe-VIIIe, IIw, Vw, VIIw, and VIIIs.

Appendix Table 3--Percentage distribution of farms by value of agricultural sales for southwest Georgia and Georgia 1/

Value of sales	1974	1978 2/
Dollars	Percent	
Southwest Georgia:		
100,000 and over	12.6	16.7
40,000 - 99,999	16.8	18.3
20,000 - 39,999	14.8	14.1
10,000 - 19,999	13.6	12.9
5,000 - 9,999	12.0	11.6
2,500 - 4,999	8.7	10.4
Less than 2,500	21.5	16.0
Georgia:		
100,000 and over	8.6	11.3
40,000 - 99,999	13.0	11.1
20,000 - 39,999	10.4	8.2
10,000 - 19,999	10.8	9.8
5,000 - 9,999	11.2	11.9
2,500 - 4,999	9.9	14.0
Less than 2,500	36.1	33.7

1/ Value of sales in current dollars for each census year. Because of changes in definitions and procedures between census years, data are not strictly comparable.

2/ State data are based on results of a mail survey plus an area segment sample. Data from the area segment sample are not included in the county level data and, therefore, not in the southwest Georgia totals.

Source: (1).

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